INTERNATIONAL STANDARD

ISO/IEC 25435

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Data Interchange on 60 mm Read-Only ODC — Capacity: 1,8 Gbytes (UMD™)

Échange de données sur disque optique de 60 mm en lecture seule — Capacité: 1,8 Go (UMD™)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 25435 was prepared by Ecma TC 31 (as ECMA-365) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Introduction

Ecma Technical Committee TC 31 was established in 1984 for the standardization of Optical Disks and Optical Disk Cartridges (ODC). Since its establishment, the Committee has made major contributions to ISO/IEC SC 23 toward the development of International Standards for 80 mm, 90 mm, 120 mm, 130 mm, 300 mm, and 356 mm media. Numerous standards have been developed by TC 31 and published by Ecma International, almost all of which have also been adopted by ISO/IEC under the fast-track procedure as International Standards.

The need for further miniaturization had been recognized for use in portable electronic devices as a result of consumer acceptance of products based on previous Ecma CD-ROM and DVD-Read-Only Disk standards, ECMA-130, ECMA-267, ECMA-268 respectively.

In October 2004 a group of companies proposed to TC31 to develop an International Standard for the first 60 mm optical ROM disk. TC31 adopted this project and started the standardization work.

This disk is identified as Universal Media Disc (UMD™). (UMD™ is the trade mark of Sony Computer Entertainment Inc.)

Data Interchange on 60 mm Read-Only ODC — Capacity: 1,8 Gbytes (UMD™)

Section 1 — General

1 Scope

This International Standard specifies the mechanical, physical and optical characteristics of a 60 mm, read-only ODC having a maximum capacity of 1,8 Gbytes. It specifies the physical format, the quality of the recorded signals, the format of the data and its modulation method, thereby allowing for information interchange by means of such ODCs.

This International Standard specifies two types of ODCs, Type A and Type B:

Type A: Single layer disk with maximum recorded capacity of 0,9 G-bytes;

Type B: Dual layer disk with maximum recorded capacity of 1,8 G-bytes.

Information interchange between systems also requires, at a minimum, agreement between the interchange parties upon the interchange code(s) and the specifications of the structure and labeling of the information on the interchanged ODCs. UMD™ is the trade mark of Sony Computer Entertainment Inc.

2 Conformance

2.1 Optical disk cartridge

A claim of conformance shall specify the Type of the ODC. An ODC shall be in conformance with this International Standard if it meets the mandatory requirements specified for its Type.

2.2 Generating system

A generating system shall be in conformance with this International Standard if the ODC it generates is in accordance with 2.1.

2.3 Receiving system

A receiving system shall be in conformance with this International Standard if it is able to handle both Types of ODC according to 2.1.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16143-1:2004, *Stainless steels for general purposes — Part 1: Flat products*

ECMA-287, *Safety of electronic equipment* — 2nd edition (December 2002)

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

4.1
channel bit
elements by which, after modulation, the binary values ZERO and ONE are represented on the disk by pits

4.2
clamping zone
annular part of the substrate within which a clamping force is applied by a clamping device

4.3
Digital Sum Value
arithmetic sum obtained from a bit stream by allocating the decimal value 1 to bits set to ONE and the decimal value -1 to bits set to ZERO

4.4
Disk Reference Plane
plane defined by the perfectly flat annular surface of an ideal spindle onto which the Clamping Zone of the disk is clamped, and which is normal to the axis of rotation

4.5
Dual Layer disk
optical disk with a single entrance surface that gives access to a pair of recorded layers L0 and L1 which are located on substrates 0 and 1 respectively

4.6
dummy layer
recorded layer located on substrate 1 whose main data is all (00), i.e. dummy data

4.7
entrance surface
surface of substrate 0 onto which the optical beam first impinges

4.8
optical disk
disk that accepts and retains information in the form of pits in a recorded layer that can be read by an optical beam

4.9
physical sector number
serial number allocated to physical sectors on the disk

4.10
pit
embossed feature of the recorded layer which influences the optical phase of the incident light

4.11
read-only disk
optical disk in which the information has been recorded during manufacturing and may not be altered by subsequent recording systems

4.12
recorded layer
layer of the disk on, or in, which data is recorded

4.13
Reed-Solomon code
error detection and/or correction code

4.14
sector
smallest part of a track in the Information Zone that can be accessed independently of other addressable parts

4.15
Single Layer disk
optical disk having a single user data layer recorded on substrate 0, with substrate 1 containing only dummy data

4.16
spacer
transparent layer placed between two recorded layers or between a recorded layer and a dummy layer

4.17
substrate
layer of the disk which provides mechanical support of the recorded layer(s)

4.18
substrate 0
substrate located on the optical entrance side through which the optical beam accesses the recorded layer(s)

4.19
substrate 1
substrate located on the opposite side from the optical beam and is bonded to substrate 0, having no optical parameter requirement

4.20
track
360° turn of a continuous spiral

4.21
track pitch
distance between the centrelines of a pair of adjacent physical tracks, measured in radial direction

4.22
zone
annular area of the disk

5 Conventions and notations

5.1 Representation of numbers

— A measured value is rounded off to the least significant digit of the corresponding specified value. For instance, it implies that a specified value of 1,26 with a positive tolerance of + 0,01 and a negative tolerance of - 0,02 allows a range of measured values from 1,235 to 1,275.

— Numbers in decimal notations are represented by the digits 0 to 9.

— Numbers in hexadecimal notation are represented by the hexadecimal digits 0 to 9 and A to F in parentheses.

— The setting of bits is denoted by ZERO and ONE.

— Numbers in binary notations and bit patterns are represented by strings of digits 0 and 1, with the most significant bit shown to the left.

— Negative values of numbers in binary notation are given as Two's complement.

— In each field the data is recorded so that the most significant byte (MSB), identified as Byte 0, is recorded first and the least significant byte (LSB) last.

— In a field of 8n bits, bit b(8n-1) shall be the most significant bit (msb) and bit b0 the least significant bit (lsb).

— Bit b(8n-1) is recorded first.

5.2 Names

The names of entities, e.g. specific tracks, fields, zones, etc. are given a capital initial.

6 List of acronyms

a.c.	alternate current
BP	Byte Position
BPF	Band Pass Filter
CLV	Constant Linear Velocity
CPR_MAI	Copyright Management Information
d.c.	direct current
DL	Dual Layer
DSV	Digital Sum Value
ECC	Error Correction Code
EDC	Error Detection Code
EQ	Equalizer
FWHM	Full Width at Half Maximum
HF	High Frequency
ID	Identification Data
IED	ID Error Detection code
IR	Index of Refraction
LPF	Low-Pass Filter

LSB	Least Significant Byte
lsb	least significant bit
MI	Media Information
MSB	Most Significant Byte
msb	most significant bit
NRZ	Non Return to Zero
NRZI	Non Return to Zero Inverted
OTP	Opposite Track Path
PBS	Polarizing Beam Splitter
PE	Phase Encoded
PI	Parity of the Inner
PLL	Phase-Locked Loop
PO	Parity of the Outer
PP	Push-Pull
PTP	Parallel Track Path
PUH	Pick Up Head
RIN	Relative Intensity Noise
RLL	Run Length Limited
RS	Reed-Solomon
RZ	Return to Zero
SL	Single Layer
SYNC	Synchronisation

7 General description of the ODC

The optical disk cartridge which is the subject of this International Standard consists of a case containing an optical disk.

The case is a protective enclosure for the disk. It has access windows and it may be covered by a shutter.

The optical disk that is the subject of this International Standard consists of two substrates bonded together by a spacer, so that the recorded layers are on the inside. The centring of the disk is performed on the edge of the centre hole of substrate 0. Clamping is performed in the Clamping Zone by the mageto-static force on the clamping plate provided by the clamping mechanism of the drive. This International Standard specifies the following Types (see Figure 1):

Type A: Single layer disk with maximum recorded capacity of 0,9 G-bytes recorded on substrate 0. Substrate 1 contains dummy data.

Type B: Dual layer disk with maximum recorded capacity of 1,8 G-bytes. All data is accessed through substrate 0.

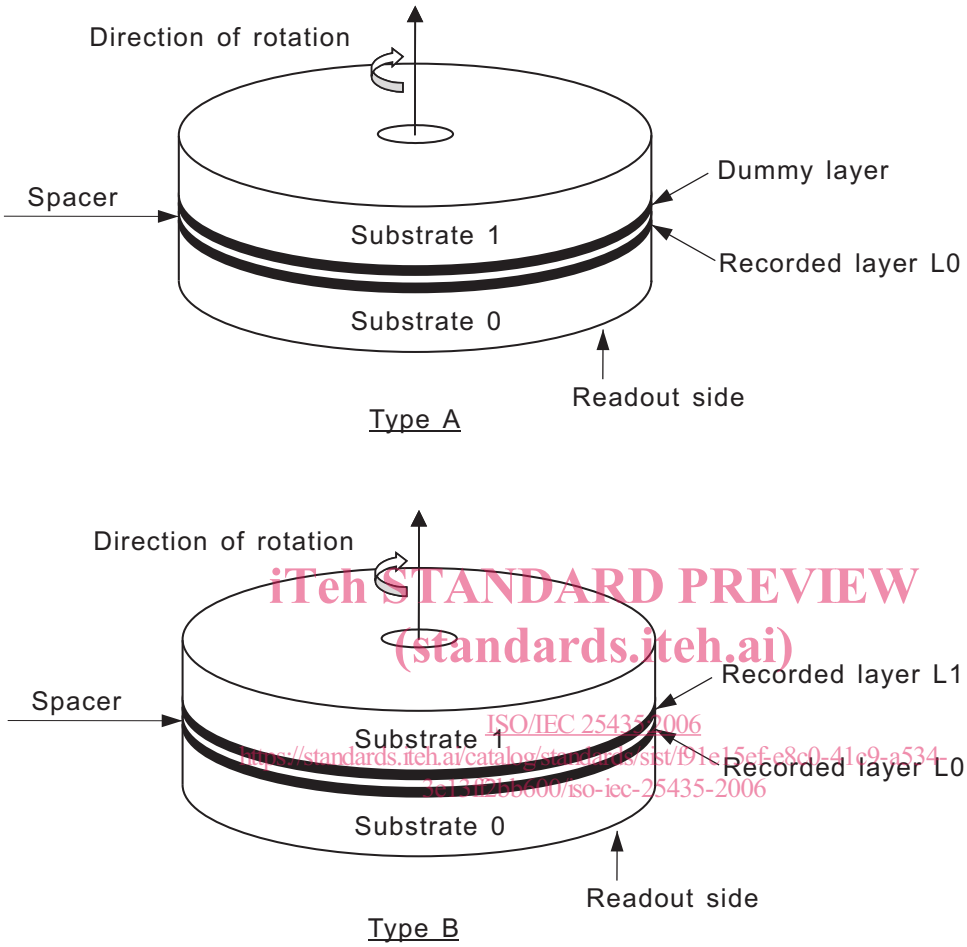

Figure 1 — Types of 60 mm Read-Only disks

8 Environments and Safety

8.1 Environments

8.1.1 Test environment

The test environment is the environment where the air immediately surrounding the disk has the following properties.

	a) For dimensional measurements	b) For the other measurements
temperature	: 23 °C ± 2 °C	15 °C to 35 °C
relative humidity	: 45 % to 55 %	45 % to 75 %
atmospheric pressure	: 86 kPa to 106 kPa	86 kPa to 106 kPa

No condensation on or in the case or cartridge shall occur. Before testing, the case or cartridge shall be conditioned in this environment for 48 hours minimum. Unless otherwise stated, all tests and measurements shall be made in this test environment.

8.1.2 Operating environment

This International Standard requires that an optical disk which meets all mandatory requirements in the specified test environment provides data interchange over the specified ranges of environmental parameters in the operating environment.

Disks used for data interchange shall be operated under the following conditions, when mounted in the drive supplied with voltage and measured on the outside surface of the disk.

The disk exposed to storage conditions shall be conditioned in the operating environment for at least two hours before operating.

temperature	: - 25 °C to 70 °C
relative humidity	: 3 % to 95 %
absolute humidity	: 0,5 g/m^3 to 60 g/m^3
sudden change of temperature	: 50 °C max.
sudden change of relative humidity	: 30 % max.

There shall be no condensation of moisture on the disk.

8.1.3 Storage environment

The storage environment is the environment where the air immediately surrounding the optical disk shall have the following properties.

temperature	: - 20 °C to 50 °C
relative humidity	: 5 % to 90 %
absolute humidity	: 1 g/m^3 to 30 g/m^3
atmospheric pressure	: 75 kPa to 106 kPa
temperature variation	: 15 °C/h max.
relative humidity variation	: 10 %/h max.

8.1.4 Transportation

This International Standard does not specify requirements for transportation; guidance is given in Annex H.

8.2 Safety requirements

The disk shall satisfy the requirements of Standard ECMA-287, when used in the intended manner or in any foreseeable use in an information system.